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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/909,592	07/20/2001	William Downs	6152	3298
7590	10/01/2003		EXAMINER	
McDermott Incorporated, Patent Department Alliance Research Center 1562 Beeson Street Alliance, OH 44601-2196			LEUNG, JENNIFER A	
			ART UNIT	PAPER NUMBER
			1764	

DATE MAILED: 10/01/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

AS

<b>Office Action Summary</b>	Application No.	Applicant(s)
	09/909,592	DOWNS ET AL.
	Examiner	Art Unit
	Jennifer A. Leung	1764

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) Responsive to communication(s) filed on \_\_\_\_\_.  
 2a) This action is FINAL.                  2b) This action is non-final.  
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) Claim(s) 1-20 is/are pending in the application.  
 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
 5) Claim(s) \_\_\_\_\_ is/are allowed.  
 6) Claim(s) 1-20 is/are rejected.  
 7) Claim(s) \_\_\_\_\_ is/are objected to.  
 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) The specification is objected to by the Examiner.  
 10) The drawing(s) filed on 20 July 2001 is/are: a) accepted or b) objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 11) The proposed drawing correction filed on \_\_\_\_\_ is: a) approved b) disapproved by the Examiner.  
     If approved, corrected drawings are required in reply to this Office action.  
 12) The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) All b) Some \* c) None of:  
 1. Certified copies of the priority documents have been received.  
 2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
 \* See the attached detailed Office action for a list of the certified copies not received.  
 14) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
 a) The translation of the foreign language provisional application has been received.  
 15) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____  |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>02/25/02</u> . | 6) <input type="checkbox"/> Other: _____                                    |

## **DETAILED ACTION**

### ***Specification***

1. The disclosure is objected to because on page 7, section [043], "is the shape factor" should be deleted. Appropriate correction is required.

### ***Claim Objections***

2. Claim 8 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim (i.e., claim 4). Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1-12 and 16-18 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 1, it is unclear as to the structural limitation applicants are attempting to recite by, "a CO<sub>2</sub> solvent supplied to the bed," since a solvent is not considered an element of the apparatus.

Regarding claim 3, the language of the claim is drawn to a method limitation which renders the claim vague and indefinite, as it is unclear as to the structural limitation applicants are attempting to recite, since the "solvent" is not considered an element of the apparatus.

Regarding claim 6, the language of the claim is drawn to a method limitation which renders the claim vague and indefinite, as it is unclear as to the structural limitation applicants are attempting to recite by, “the means... includes transporting the portion of the solvent which contains the removed, preselected and dissolved CO<sub>2</sub>,” since “transporting” the solvent is not considered an element of the apparatus but a process limitation.

Regarding claims 11, 12, 17 and 18, the language of the claims is drawn to a process limitation which renders the claims vague and indefinite, as it is unclear as to the structural limitation applicants are attempting to recite by, “at least/no more than 90% of the original CO<sub>2</sub> concentration of the gas is dissolved...” since the percentage of dissolved CO<sub>2</sub> is not considered an element of the apparatus.

Regarding claim 16, the language of the claims is drawn to a method limitation which renders the claims vague and indefinite, as it is unclear as to the structural limitation applicants are attempting to recite by, “... determined by the flow rate of the water divided by the superficial velocity of the water,” since the flow rate, the superficial velocity, and the determined ratio water are not considered elements of the apparatus.

#### ***Definition of Means plus Function***

4. Invoking 35 U.S.C. 112, sixth paragraph, the following claim elements are defined for the purpose of claim analysis:

- distribution means: “preferably, through manifolds, the perforated pipes buried in the bed, etc.” (section [064], lines 1-3).
- chemical means: “granulated limestone or any other substance known to those skilled in the art which would assist or affect the removal of CO<sub>2</sub>.” (section [065], lines 1-3).

- means for dissolving the removed, preselected amount of CO<sub>2</sub> into the solvent: “any physical apparatus which disperses and dissolves the captured CO<sub>2</sub> into the water supply, including but not limited to grates, atomizers and the like.” (section [065], lines 5-7).
- means for disposing of a portion of the solvent: “sloping channels which drive the water through the bed by the force of gravity, or alternative or additional pumps, pipes or other means which carry the waste water from the bed.” (section [065], lines 7-10).
- means for supplying water at a controlled flow rate into at least one inlet channel (as best understood): a water supply channel 20 and equivalent structures (Figure 1A).
- means for transporting the water from the chemical means into at least one outlet channel (as best understood): a grated passage 34 and equivalent structures (FIG. 3).

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1-3, 5-7, 11-18 and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by Schnur (U.S. 2,719,032).

Regarding claims 1-3 and 5, Schnur (FIG. 1, 2; column 5, lines 16-23) discloses an apparatus for removing carbon dioxide, comprising a reaction bed (defined by container 1); distribution means for introducing a gas (collecting pipe 5, perforated blow pipes 6); chemical means disposed within the bed (alkaline liquid; column 2, lines 67-72); means for dissolving the gas into the solvent, comprising a series of drains integrated into the bed (partitions 4, defining a

series of passages or "drains" at the lower edge; column 3, lines 42-47); and means for disposing of a portion of the solvent containing the dissolved gas (overflow pipe 3). The claimed recitation of "a CO<sub>2</sub> solvent supplied to the bed" provides no further structural limitation, as the solvent is not considered an element of the apparatus. In any event, Schnur discloses a solvent may comprise water (column 2, line 67 to column 3, line 28).

Regarding claim 6, no additional structural limitations are recited since the intended use of the solvent, such as the recited, "transporting to... a CO<sub>2</sub> storage facility, a deep ocean location, an underground aquifer and a depleted gas well," is not considered an element of the apparatus but a process limitation. Thus, the apparatus of Schnur meets the claim.

Regarding claim 7, the flow of solvent via the means for disposing (i.e., overflow pipe 3) is inherently driven by gravitational forces, as evidenced by the overflow pipe 3 being located at the liquid surface (column 3, lines 29-42).

Regarding claims 11 and 12, no additional structural limitations are recited since the percentage of CO<sub>2</sub> dissolved in the solvent is not considered an element of the apparatus but a process limitation. Therefore, the apparatus of Schnur meets the claims.

Regarding claims 13-15, Schnur (FIG. 1, 2) discloses an apparatus comprising a plurality of inlet channels having a defined length and height (i.e., the alternate container compartments as defined by partitions 4, provided with perforated blow pipes 6; column 3, lines 48-52; FIG. 2); means for supplying water at a controlled flow rate into at least one inlet channel (supply line 2); chemical means in fluidic contact with at least one inlet channel (i.e., alkaline liquid; column 2, lines 67-72); distribution means for distributing gas such that the gas contacts the chemical means (collecting pipe 5, blow pipes 6); a plurality of outlet channels having a defined length

and height located proximate to the chemical means (i.e., the alternate container compartments as defined by partitions 4, without blow pipes 6; column 3, lines 48-65); and means for transporting water into at least one outlet channel (the partitions 4), the means for transporting being in fluidic contact with the chemical means and comprising at least one drain gate (i.e., the series of passages or "drains" at the lower edge of partition 4, as shown in FIG. 1; or, in a separate embodiment, slits 31a-d formed in partitions 26, as shown in FIG. 5).

Regarding claim 16, the claimed recitation of, "... determined by the flow rate of the water divided by a superficial velocity of the water," provides no further structural limitation since such ratio is not considered an element of the apparatus but a process limitation, and therefore the apparatus of Schnur meets the claim. In any event, Schnur discloses the number of containers and numerous partitions will depend on the fixed quantity of liquid in the containers, requirements of the washing process, hydrostatic pressure, and flow velocity of the liquid, for example (column 3, lines 29-47).

Regarding claims 17 and 18, no additional structural limitations are recited since the percentage of CO<sub>2</sub> dissolved in the solvent is not considered an element of the apparatus but a process limitation. Therefore, the apparatus of Schnur meets the claims.

Regarding claim 20, the means for transporting the water (partitions 4) is inherently driven by gravitational forces, as evidenced by the disclosure of, "a circulation of the washing liquid, which flows upward in the container compartments provided with the injection nozzles and *flows downward again* in the adjacent compartments which are not provided with injection nozzles," (column 3, lines 52-58).

Instant claims 1-3, 5-7, 11-18 and 20 structurally read on the apparatus of Schnur.

6. Claims 1-3, 5-7, 11 and 12 are rejected under 35 U.S.C. 102(b) as being anticipated by Fischerstrom et al. (U.S. 2,708,571).

Regarding claims 1-3, Fischerstrom et al. (FIG. 1-3; column 1, line 69 to column 3, line 6) disclose an apparatus comprising a reaction bed (defined by container **1**); a distribution means for introducing a gas into the bed (i.e., distribution pipes **14** with perforations **16**, main pipe **15**; column 2, line 45 to column 3, line 6); a means for dissolving the removed, preselected amount of CO<sub>2</sub> into the solvent (i.e., partition wall **5**, serving as a physical apparatus which disperses and dissolves the gas by causing a “longitudinal” and “spiral” motion; column 2, lines 24-44); and a means for disposing a portion of the solvent which contains the removed, preselected and dissolved CO<sub>2</sub> (i.e., outlet pipe **11**, sloping side portions **3**). Fischerstrom et al. further disclose that the apparatus may be used for, “... treating waters with carbon dioxide and for aeration of sewage according to the active sludge process and similar treatments,” (column 1, lines 15-19). Therefore the apparatus meets the claim of a chemical means, which has been defined as “*any other substance* known to those skilled in the art which would assist or affect the removal of CO<sub>2</sub>”, since the CO<sub>2</sub> is dissolved or removed during the treatment of water or sewage. Additionally, the claimed recitation of “a CO<sub>2</sub> solvent supplied to the bed” provides no further structural limitation, as the solvent is not considered an element of the apparatus.

Regarding claim 5, Fischerstrom discloses the means for dissolving the CO<sub>2</sub> comprises a series of drains integrated into the bed (i.e., openings **8**), defined by the lower edge of partition **5**.

Regarding claim 6, no additional structural limitations are recited since the intended use of the solvent, such as the recited, “transporting to... a CO<sub>2</sub> storage facility, a deep ocean location, an underground aquifer and a depleted gas well,” is not considered an element of the

apparatus but a process limitation. Thus, the apparatus of Fischerstrom et al. meets the claim.

Regarding claim 7, Fischerstrom discloses that the means for disposing is inherently driven by gravitational forces (i.e., "outlet 11 is... located at such a level as to establish a relatively definite liquid level 13 in the container," (column 2, lines 5-9); and, as defined by sloping side portions 3, "the dimensions and shape of this compartment the liquid will sink substantially uniform to the bottom..." column 2, lines 34-36).

Regarding claims 11 and 12, no additional structural limitations are recited since the percentage of CO<sub>2</sub> dissolved in the solvent is not considered an element of the apparatus but a process limitation. Therefore, the apparatus of Fischerstrom et al. meets the claims.

Instant claims 1-3, 5-7, 11 and 12 structurally read on the apparatus of Fischerstrom et al.

#### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 4 and 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schnur (U.S. 2,719,032) in view of Rau et al. (*Energy Conversion & Management* 40, pages 1803-1818, 1999).

Regarding claims 4 and 8-10, although Schnur is silent as to whether the chemical means (the alkaline liquid) may comprise the recited granulated limestone, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select an appropriate chemical, such as granulated limestone, for the chemical means in the apparatus of Schnur, since limestone is well known in the art as a material used for the generation of alkaline solutions as well as the treatment of CO<sub>2</sub> containing flue gases, as evidenced by Rau et al. (Sections “1. Introduction” and “2. Relevant chemistry”; pp. 1803-1805). Additionally, it would have been an obvious design choice for one of ordinary skill in the art at the time the invention was made to select an appropriate diameter for the limestone in the apparatus of Schnur, on the basis of suitability for the intended use, since it has been held that changes in size involve only ordinary skill in the art. *In re Rose*, 220 F.2d 459, 463, 105 USPQ 237, 240 (CCPA 1955), and where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller*, 105 USPQ 233.

Regarding claim 19, although Schnur is silent as to the specific source for the supplied water, it would have been an obvious design choice for one of ordinary skill in the art at the time the invention was made to select an appropriate water source, such as one of the sources, for the apparatus of Schnur, on the basis of suitability for the intended use, since the recited sources of water are well known in the art and serve as attractive, no-cost water sources, as evidenced by Rau et al. (Section “4. Water considerations”, page 1807).

***Conclusion***

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: Downs '535 and '705 are provided to illustrate applicant's relevant, related inventions.

\* \* \*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer A. Leung whose telephone number is 703-305-4951. The examiner can normally be reached on 8:30 am - 5:30 pm M-F, every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn A. Caldarola can be reached on 703-308-6824. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Jennifer A. Leung  
September 23, 2003

*JAL*

*Hien Tran*  
HIENTRAN  
PRIMARY EXAMINER